



DMC-1152X

DeltaMax™ Controller for DMS-1152/64 Series Sound-Reinforcement Speaker System

- Fixed, optimized system equalization and signal delay for smooth frequency response
- Active sensing broadband compressor circuit, with varying compression ratio, provides speaker thermal protection
- Active sensing speaker overexcursion protection with soft-clip limiting
- User-adjustable power amplifier clip calibration circuitry
- LED displays for each band indicate protection mode
- Variable low-frequency shelving EQ controls "bass buildup" of multiple units
- High current output drives many paralleled power amplifiers

Description

The DeltaMax™ system consists of a two-way, biamped, high-performance speaker system and a companion electronic controller. The electronic protection technology in the DMC-1152X DeltaMax™ controller allows the loudspeakers to be operated at full capacity with maximum fidelity and reliability. The DMS-1152/64 is a compact, full-range loudspeaker system, intended for high-level sound reinforcement in touring sound and permanent installations.

The electronic circuits are designed to provide optimum audio performance, even when the audio drive level is increased for maximum loudness. A high-performance compressor, with automatically variable compression ratio, is controlled by special speaker modeling circuits to provide speaker temperature protection and amplifier anticlip limiting. Speaker excursion protection is accomplished with a voltage-limit system which operates from an excursion versus frequency modeling circuit. Front panel indicator lights show input level, compressor gain reduction, and HF and LF output-limit thresholds for excursion, temperature, amplifier power. Operation of all protection functions is completely automatic. Variable

low-frequency shelving equalization is available to control the bass buildup of multiple units used in arrays.

The DeltaMax™ system will work with any professional power amplifier within the stated power and gain range. See Amplifier Requirements section.

Principle Of Operation

Refer to the block diagram in Figure 3.

The signal path consists of an active differential input circuit which drives a VCA, which is controlled by a special compressor circuit. After the VCA is a fourth-order Linkwitz-Riley crossover circuit.

The high-frequency output has an equalizer which flattens the frequency response of the constant-directivity horn and compression driver from their natural mass-loaded response characteristic.

The low-frequency output has a delay equalizer to compensate for the relative physical positioning of the LF and HF drivers, and their actual phase response at the crossover frequency. An underdamped second-order high-pass filter, combined with a variation of a first-order shelving low-boost function provides optimum low-frequency response with the DeltaMax™ loudspeakers.

Figure 1 shows the combined response of the DMC-1152X controller and the DMS-1152/64 speaker system. Figure 2 shows the response of the controller alone. The output sections provide electronically balanced, low-distortion differential drive signals.

The compressor has both a signal control input and a compression-ratio control input. The control voltages are developed from the sense channels. The primary dynamic action (gain reduction) of the compressor is controlled by a dual-time-constant detection circuit driven by rectified audio sensed at the speaker terminals. The compression ratio above the threshold is determined by the condition of the speakers. Temperature modeling circuits will increase this compression ratio when it becomes necessary. Compression will also increase to prevent amplifier clipping if this function is selected.

The compressor gain transfer has a gradually changing slope across its threshold. This soft-knee design reduces the audibility of the compression. The compression ratio above the threshold can vary from 1:1 (no effect) to about 20:1 (hard limiting).

A dynamic, frequency-sensitive voltage limiter at the output of each frequency band pro-

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protects the speakers from excursion damage. If one of the speakers approaches its excursion limit, the peak of the output waveform is clamped at a level above which excursion damage would occur.

Installation

Mounting

The unit is one rack space high, 44.5 mm (1.75 in.), and fits a standard EIA 19-inch rack. Mount the DMC controller in a rack cabinet near the power amplifier(s) to make wiring easy.

Grounding

A widely accepted grounding technique for audio systems is the star connection (single-point) ground. The final configuration will be determined by the size of the system and the equipment used in the system. However, the star-connection grounding system is recommended as a starting point.

Never lift the third wire safety ground of the ac power cable. It protects against possible shock hazard.

Ventilation

Adequate ventilation should be provided in the rack to maintain a reasonable operating temperature. Under any conditions the ambient temperature inside the rack cabinet should not exceed 60 °C (140 °F).

Security

A security cover and attachment screws are supplied to protect the control settings against uninvited adjustments.

Connections

The DeltaMax™ controller has XLR-type connectors for signal input and outputs. Pin 1 is shield, pin 2 is high (+), and pin 3 is low (-). The input is active differential and the outputs are electronically balanced. When used in an unbalanced configuration, pin 3 should be shorted to ground.

The LF and HF sense connections are dual-binding-post/banana jacks (five-way binding posts). The sense inputs are active differential, enabling connection to the output of mono-bridged amplifiers, and are high impedance, allowing small gauge wire (e.g., #22 AWG) to be used for the sense connection. Although current flow in the sense lines

is negligible, they must be capable of handling the high output voltages of the amplifiers.

Amplifier Requirements

The DMS-1152/64 speaker system requires professional power amplifiers with the following ratings:

LF: 600-1200 watts continuous into 8 ohms

HF: 125-250 watts continuous into 8 ohms

The use of amplifiers with lower power ratings is acceptable; however, the full power capabilities of the DMS speakers will not be realized. The use of amplifiers with significantly higher power ratings is wasteful and may endanger the loudspeakers; it is generally not recommended.

Under certain circumstances, however, higher rated power amplifiers are acceptable. It is acceptable to drive the DMS-1152/64 speaker with a stereo power amp utilizing one channel to drive the low frequencies and the other channel to drive the high frequencies. For an extra degree of protection when operating in this configuration, the user may want to set the HF amplifier calibration level to the 250-watt position to limit excessively high power levels from reaching the compression driver.

DMS-1152/64 speakers may be paralleled with other DMS-1152/64 speakers if the amplifier is capable of delivering adequate power to each speaker at the lower impedance. Under no circumstances should DMS-1122/85 and DMS-1152/64 speakers be paralleled on the same amplifier channels.

Architects' And Engineers' Specifications

The controller shall consist of a single-channel two-way crossover circuit with fourth-order Linkwitz-Riley filters, a compressor system with variable compression ratio and dual-time-constant detector, a voltage clamping circuit for excursion protection, and speaker modeling circuits which control the compressor and clamp circuits to prevent destruction of the high-frequency and low-frequency drivers due to excessive drive level

without shifting high-pass, low-pass or crossover filters. Included in the signal path shall be special frequency and signal-delay equalization to provide flat (± 3 dB) on-axis anechoic frequency response in the range of 50 Hz to 20 kHz for the DMS-1152/64 series loudspeakers.

The total harmonic distortion through the signal path shall be nominally 0.03% and no greater than 0.1% from 20 Hz to 20 kHz, within the output's pass band. The noise at the outputs, measured with a 20- to 20,000-Hz equivalent-noise-bandwidth filter, shall be typically -86 dBu.

The signal input shall be active differential with a level capability of +18 dBu, and have a female 3-pin XLR-type connector. The outputs shall be electronically balanced with a level capability of +18 dBu into 600 ohms, and male 3-pin XLR-type connectors. There shall be two active differential sense inputs for speaker protection, with binding-post/banana-jack connectors.

Front-panel controls shall include LF and HF level controls, LF and HF amplifier calibration controls a variable LF shelving control to compensate for a bass buildup of multiple arrayed speakers, and a switch to control the amplifier limit function, all accessible with a screwdriver, after removing the security cover. There shall be a power switch on the front panel.

Front-panel indicators shall include input level, gain reduction, LF output limits (for amplifier, excursion and temperature), HF output limits (for amplifier, excursion and temperature), and power on.

The chassis shall be made of painted steel with a gray front panel and white graphics. It shall be rack mountable in a 483-mm (19-inch) EIA rack, and be 44.5-mm (1.75 in.) high and 228 mm (8.97 in.) deep overall, including connectors. The unit shall weigh 3.2 kg (7 lb). The unit shall be an Electro-Voice DMC-1152X.

Uniform Limited Warranty

Electro-Voice products are guaranteed against malfunction due to defects in materials or workmanship for a specified period, as noted in the individual product-line statement(s) below, or in the individual prod-

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System Specifications¹

System Frequency Response,
DMC-1152X with DMS-1152/64
Series Speaker, One Watt into LF
Mid Band (2.83 volts at 250 Hz) on
Axis in Anechoic Environment
(see Figure 1):
50-20,000 Hz, ± 3 dB

Controller Specifications

General Functions:

Two-way crossover, frequency and
signal-delay equalizer and protec-
tion system for DMS-1152/64 series
speaker system

Channel Configuration:

Single-channel two way; two sense
channels (LF and HF)

Crossover Frequency:

1,480 Hz

Crossover Filter:

4th-order Linkwitz-Riley

Gain:

+5 dB nominal, LF and HF outputs

Signal-Path Equalization, DMC-1152X (see Figure 2),

LF EQ:

-2 dB at 33 Hz, +2 dB at 55 Hz

LF Signal Delay:

0.49 ms at crossover frequency

HF EQ:

4th order optimized for DMS-
1152/64 series HF driver and horn

Total Harmonic Distortion, 20- 20,000 Hz:

0.03% typical, 0.1% maximum

Noise, Each Output, 20- to 20,000-Hz

Bandwidth, Typical:

-86 dBu²

Signal Input,

Type:

Active differential

Maximum Level:

+18 dBu²

Impedance:

20,000 ohms and 0.0015 μ f

Common-Mode Range:

± 24 volts

CMRR, Typical:

-55 dB

Connector:

Female 3-pin XLR-type

Signal Outputs (LF and HF),

Type:

Electronically balanced

Maximum Level:

+18 dBu²

Minimum Load Impedance for Full Level:

600 ohms

Protection:

Safe for short circuit or ± 25 volts dc

Connectors:

Male 3-pin XLR-type

Sense Channel Inputs (LF and HF),

Type:

Active differential

Maximum Level:

145 volts rms

Impedance:

200,000 ohms differential

Connector:

Two binding posts/banana jacks,
spaced 19 mm (0.75 in.)

Controls (all except power switch are screwdriver operated):

Output level, each output; ampli-
fier limit calibration, each sense
channel; amplifier clip/limit
switch; LF shelving power switch

Indicators:

Three-LED input level
(-20, 0, and +16 dBu)
Three-LED gain reduction
(3, 6, and 12 dB)
Three-LED LF output limits
(amplifier, excursion, temperature)
Three-LED HF output limits
(amplifier, excursion, temperature)
One-LED power on

Power Requirement:

100, 120, 220, or 240 volts ac, 50-
60 Hz, 13 watts

Chassis Construction:

Painted steel

Color:

Gray front panel and black chassis
with white graphics

Mounting and Overall Dimensions (see Figure 4):

EIA 483 mm (19 in.) rack mount,
44.5 mm (1.75 in.) high, 228 mm
(8.97 in.) behind panel including
connectors; supplied with front-
panel security cover for controls

Weight,

Net:

3.2 kg (7 lb)

Shipping:

4.2 kg (9 lb, 3 oz)

1. See DMS-1152/64 series engineering data
sheet for detailed speaker system
specifications.
2. 0 dBu is 0.775 volts rms sine wave.

DeltaMax™ DMC-1152X Controller

uct data sheet or owner's manual, beginning with the date of original purchase. If such malfunction occurs during the specified period, the product will be repaired or replaced (at our option) without charge. The product will be returned to the customer prepaid.

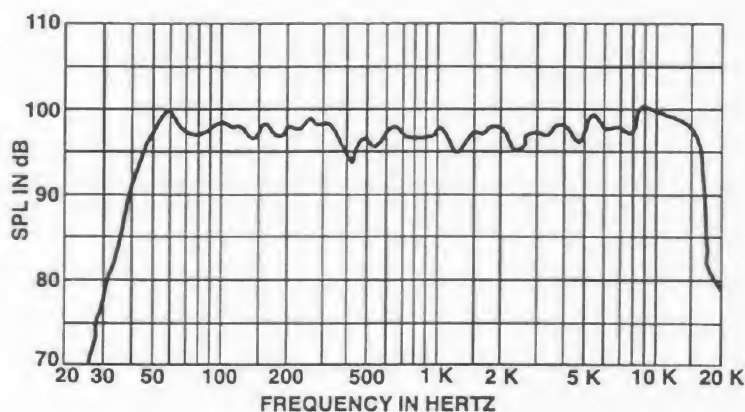
Exclusions and Limitations: The Limited Warranty does not apply to: (a) exterior finish or appearance; (b) certain specific items described in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual; (c) malfunction resulting from use or operation of the product other than as specified in the product data sheet or owner's manual; (d) malfunction resulting from misuse or abuse of the product; or (e) malfunction occurring

at any time after repairs have been made to the product by anyone other than Mark IV Audio Service or any of its authorized service representatives. **Obtaining Warranty Service:** To obtain warranty service, a customer must deliver the product, prepaid, to Mark IV Audio Service or any of its authorized service representatives together with proof of purchase of the product in the form of a bill of sale or receipted invoice. A list of authorized service representatives is available from Mark IV Audio Service at 600 Cecil Street, Buchanan, MI 49107 (800/234-6831 or FAX 616/695-4743). **Incidental and Consequential Damages Excluded:** Product repair or replacement and return to the customer are the only remedies

provided to the customer. Electro-Voice shall not be liable for any incidental or consequential damages including, without limitation, injury to persons or property or loss of use. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. **Other Rights:** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Electro-Voice Electronics are guaranteed against malfunction due to defects in materials or workmanship for a period of three (3) years from the date of original purchase. Additional details are included in the Uniform Limited Warranty statement.

Figure 1—DMS-1152/64 Frequency Response with DMC-1152X controller.



DeltaMax™ DMC-1152X Controller

Figure 2—DMC-1152X Frequency Response

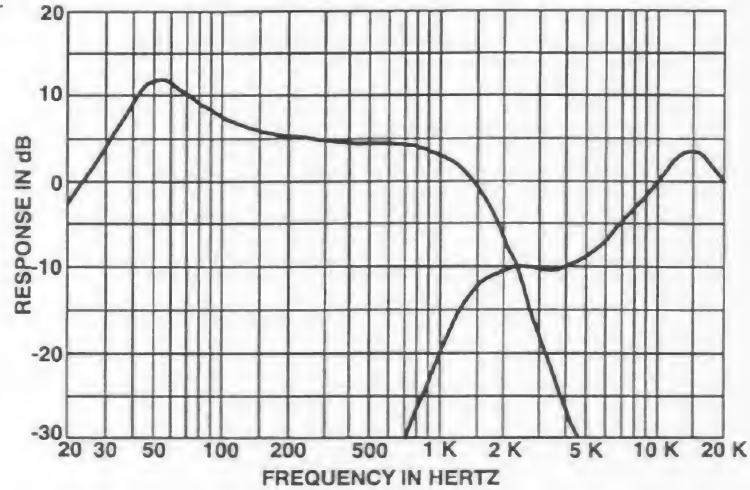


Figure 3—DMC-1152X Block Diagram

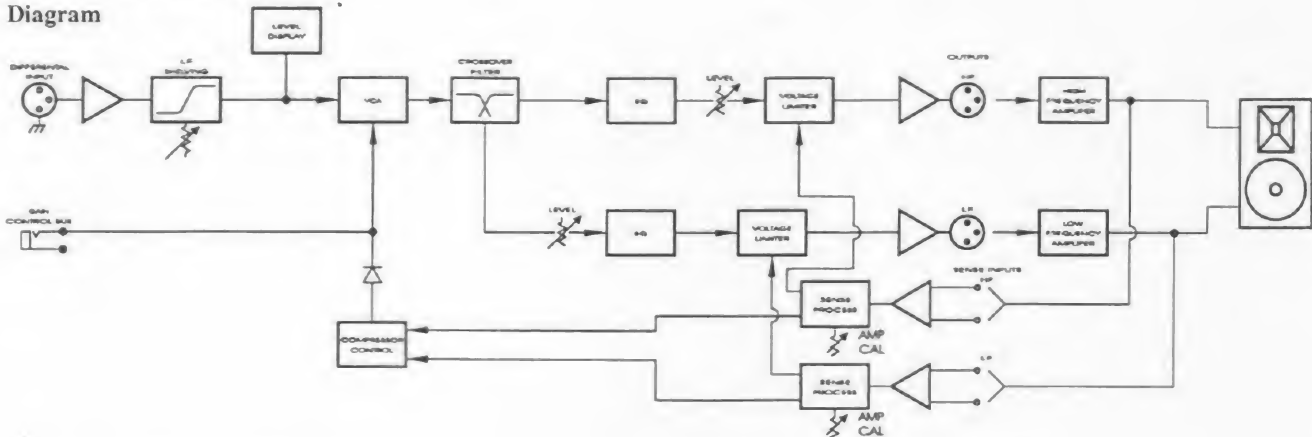


Figure 4—DMC-1152X Dimensions

